TRANSLATION (HM-618PCT):

WO 2004/033,120 A1

PCT/EP2003/008,223

LOW-FRICTION BENDING SYSTEM IN A ROLLING STAND COMPRISING SEVERAL ROLLS

The invention concerns a device for bending the rolls in a rolling stand comprising several rolls with the use of bending blocks, which are mounted at the run-in end and the runout end between the roll chocks and the housing windows and can be acted upon by control elements.

Devices of this general type are used for flatness control of a rolled product as control elements for bending the work rolls. The control element has a direct effect on the roll gap geometry in the strip edge region, such that the work rolls are bent positively around the edge of the rolls lying above them and negatively around the edges of the rolling stock.

German Patent 22 50 953 describes a rolling stand with work rolls and backup rolls and a roll bending device, in which the chocks of the work rolls are supported between blocks anchored in the housing windows and are connected by piston-cylinder

units, which are assigned to the blocks and can be acted upon on both sides to effect the work roll camber correction, such that on each block a lower and an upper guide member are supported in such a way that they can be moved vertically, whereas one of the guide members holds the cylinder, and the other guide member is connected with the piston, and the guide members are connected with the chocks in a positive-locking way in the vertical direction by horizontal guides, which are continued between the housings parallel to the rolls for the roll change. In this way, it is intended that two piston-cylinder units are necessary on each side for roll bending.

This device has proven effective in practice. However, it has the disadvantage that the cylinders must be arranged on the drive end and the tending end and on the run-in end and the runout end. This movable support of each end necessarily results in high frictional forces, which, in addition, have negative effects on the flatness control.

The goal of the invention is to reduce frictional forces in a system of this general type.

To achieve this goal, it is proposed that a piston-cylinder be assigned to the bending blocks of one of the mill housings,

and that a vertical positioning mechanism be assigned to the bending blocks of the opposite mill housing.

The positioning and locking of the bending blocks by means of the vertical positioning mechanism, preferably a spindle-type lifting gear unit, make it possible to produce a center of rotation about which the chock can be rotated. Thus, only one cylinder each is necessary to introduce the bending force into the bending blocks at the drive end and the tending end.

By virtue of the fact that there are now only two cylinders being used in the rolling stand to introduce the bending force into the bending blocks, the frictional force can be significantly reduced.

The worn zone of the rolls can also be compensated by the spindle-type lifting gear unit.

The device of the invention can also be used for intermediate roll bending in a six-high mill. Use in reversing mills is also conceivable.

Additional advantageous embodiments of the invention are disclosed in the dependent claims.

The drawings illustrate an embodiment of the invention.

-- Figure 1 shows a side view section of a four-high mill from the drive end.

-- Figure 2 shows a top view of the work roll plane of the rolling stand in Figure 1.

In a rolling stand 1, the work rolls 3, 3a are supported by the backup rolls 2, 2a. The chocks 4, 4a of the work rolls are connected by the bending blocks 5, 5a, 5', 5a' with the mill housings 6, 6'. A spindle-type lifting gear unit 10 is installed between the bending blocks 5' and 5a' and can be positioned and locked by a drive 12.

The bending blocks 5 and 5a are connected by a piston-cylinder 7, whose piston 9 is supported in bending block 5a, while its connecting rod 8 is mounted in bending block 5. The bending blocks 5, 5a, 5' and 5a' can be connected by well-known means with the chocks 4, 4a of the work rolls 3, 3a, on the one hand, and the mill housings 6, 6', on the other hand.

The rolling direction of the rolling stock passing through the mill is indicated by the double arrow 11. Flatness control is accomplished by positioning and locking the bending blocks 5', 5a' with the spindle-type lifting gear unit, while the piston-cylinder 7, which connects the bending blocks 5 and 5a

with each other, introduces the necessary bending force.

The invention is not limited to the use of spindle-type lifting gear units, but rather any vertical positioning mechanism can be used, for example, wedges with restricted guidance, a cylinder with clamping head and position sensor, or an eccentric shaft.